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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 10**  
1200 Sixth Avenue  
Seattle, WA 98101

**ACTION MEMORANDUM**

**DATE:**

**SUBJECT:** Action Memorandum for a Non-Time-Critical Removal Action at the Phase 1 Removal Area of the Harbor Island East Waterway Operable Unit, King County, Washington

**FROM:** Kevin Rochlin *KR*  
Superfund Project Manager

**TO:** Mike Gearheard  
Director, Environmental Cleanup Office

**THRU:** Chris Field *CF*  
Manager, Emergency Response Unit

Site ID - 108BBDOO

**I. PURPOSE**

The purpose of this Action Memorandum is to document the U.S. Environmental Protection Agency's (EPA) approval of the non-time-critical removal action described herein for the Phase 1 Removal Area of the Harbor Island - East Waterway Operable Unit, King County, Washington. The removal action for contaminated marine sediments at the Phase 1 Removal Area ("site") will be conducted by the Port of Seattle pursuant to an Administrative Order on Consent. The primary removal action goal for the Phase 1 Removal Area is to:

Reduce exposure of ecological receptors to sediment contamination, and thereby reduce or eliminate adverse effects on biological resources in the Phase 1 Removal area.

Although the potential risk to human receptors has not been estimated at this time, the action will reduce potential risks to human health by removing bioaccumulative chemicals that are found in the sediment.

By approval of this memorandum, EPA Region 10 determines that: 1) the conditions at the site may present an imminent and substantial endangerment to public health, or welfare, or the environment; and, 2) the site conditions meet the criteria of the National Contingency Plan (NCP), 40 CFR Section 300.415, for a removal action. An administrative record has been prepared for this removal action. No obligation of funds is necessary as this action will be conducted by the Port of Seattle under a CERCLA Administrative Order on Consent.



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## II. SITE CONDITIONS AND BACKGROUND

### A. Site Description

This is a non-time-critical removal action of the Phase 1 Removal Area within the Harbor Island East Waterway Operable Unit (EWWOU). The Harbor Island site was listed on the National Priorities List (NPL), pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, in 1983. The CERCLIS ID number is 108BBDOO for the Harbor Island site. The EPA site ID number for Harbor Island Superfund site is WAD 980722839.

#### 1. Removal Site Evaluation

Potential contaminant sources in the EWWOU are Storm Drain Systems, combined sewer overflow systems, and spills and industrial outfalls. There are no single incidents associated with the contaminants in the EWWOU or the Phase 1 Removal Area, but rather the contaminants are the result of decades of contaminants released into the waterway.

#### 2. Physical Location

The EWWOU is comprised of the East Waterway EWW of Harbor Island and its associated contamination. It is part of the Harbor Island Superfund Site which was listed on the NPL in 1983, due to the contaminants released from a secondary lead smelter, as well as the releases of other hazardous substances from other industrial operations on the island. The Site is being addressed as seven OUs: 1) the petroleum storage tank facilities, 2) soil/groundwater, 3) Lockheed Shipyard, 4) Lockheed Shipyard Sediments, 5) Todd Shipyard Sediments, 6) EWW, and 7) West Waterway. EPA is the lead agency for all but the petroleum storage tank facilities.

The closest residential properties to the EWW are approximately 0.5 mi away. Although there are no residences adjacent to the EWW, people may come in contact with contaminated sediment in the EWW directly through occupational or recreational activities, or indirectly through consumption of contaminated seafood. Public access on the EWW is limited to a small boat launch on the east shoreline at Terminal 30 and a fishing bridge at the very southern end of the waterway. Although the public boat launch is considered a direct exposure route for the general public, the fishing bridge is considered an indirect exposure pathway because contact with EWW sediment and surface water is associated indirectly through fishing activities. See Figure 1 and 2 for a location map of the EWW and the Phase 1 Removal Action Area.

#### 3. Site Characteristics

##### Development

The EWW is part of the Congressionally directed East, West, and Duwamish Waterways navigation channel. The EWW is part of the greater Duwamish River estuary, which includes the West Waterway, on the western side of Harbor Island, and the Lower Duwamish Waterway. The State holds the bed of the EWW in trust for the people of the State of Washington. It is managed by the Department of Natural Resources. The EWW is channelized, has a south-to-north orientation, and is

approximately 5,800 ft long and 800 ft wide.

The banks of the EWW support heavy manufacturing and wholesale and maritime industries associated with docking services, cargo handling, fish processing, shipbuilding, and cold storage. The resulting deep-draft vessel and barge traffic on the EWW transports millions of tons of manufacturing materials and other cargo every year.

Harbor Island forms the west bank of the EWW. Used for heavy industry since its formation in the early part of the 20th century, land uses on Harbor Island have included ocean and rail transport operations, bulk petroleum shipment and storage, lead smelting, metal recycling and fabrication, food processing, solid waste transfer, wood processing, and shipbuilding. Warehouses, laboratories, and office buildings are now, and historically have been, located on the island. There are currently 35 buildings on the island, and 95% of the island's surface is covered by impervious surface.

#### Existing Habitat Conditions

The aquatic environment of the EWW is part of the ecologically important Duwamish River estuary. Currently there is no natural shoreline in the EWW. The remaining aquatic habitats in the EWW are intertidal and subtidal sediment or water column habitats.

The Phase 1 Removal Area consists of subtidal habitat. The sediment reflects riverine inputs, and is composed of organic detritus, flocculants, and river sand. The benthic invertebrate community that inhabits the subtidal areas of EWW, including the Phase 1 Removal Area, is dominated by annelids, mollusks, and arthropods.

#### Endangered and Threatened Species

Six species reported in the vicinity of Elliott Bay area are listed under the Federal Endangered Species Act as threatened species, endangered species, or species of concern. Chinook salmon, coho salmon, bull trout, and bald eagle use of the Duwamish River estuary. Use by peregrine falcon and river lamprey have been noted as rare.

This non-time-critical removal action addresses approximately 20 acres of contaminated marine sediments within the East Waterway Operable Unit. The Phase 1 Removal Area is located offshore between Terminals 25 and 30. The removal action addresses only contaminated marine sediments. No upland actions are contemplated during this action.

#### 4. Release or threatened release into the environment of a hazardous substance, pollutant or contaminant

A total of 64 sediment samples analyzed for chemical constituents, and 35 samples used for toxicity testing were collected from the 0-15 cm and 0-4 ft sediment depth horizons to characterize the sediments within the Phase 1 Removal Area. Sediment chemistry concentrations in the Phase 1 Removal Area exceeded Washington State Sediment Management Standards (SMS) for multiple chemicals. The SMS define two levels of chemical and biological standards. The "Sediment Quality Standard" (SQS), corresponds to a sediment quality which has no acute or chronic adverse effects on marine organisms. The less stringent level, the "Cleanup Screening Level" (CSL), is

the level above which minor adverse effects occur in marine organisms.

Detected SQS exceedances were most commonly associated with mercury, total PCBs, total DDTs, alpha-chlordane, aldrin, dieldrin, BEHP, and zinc concentrations. Detected CSL exceedances were most commonly associated with mercury, total PCBs, total DDTs, and BEHP. Maximum SQS Exceedance Factors (EF), defined as multiples of exceeding the associated standard, for these chemicals range from 1.5 (for zinc) to 44 (for DDTs). Maximum CSL Exceedance Factors for these same chemicals range from 3.3 (for BEHP) to 22 for mercury. EFs for PCBs range from 2 to 19 for SQS and range from 1 to 3.6 for CSL. EFs for mercury range from 1.1 to 31 for SQS, and range from 1 to 22 for CSL. (See Table 1 and 2 and Figure 3.)

The overall results of toxicity testing indicate that sediment collected from both the 0-15 cm and 0-4 ft horizons are toxic to standard marine test organisms. Sediment from 0-4 ft was clearly toxic, demonstrating both lethal and sublethal effects. Toxicity tests have been shown to be predictive of benthic community impairment (See Table 3 and Figure 4).

The synoptic sediment chemistry and toxicity test results demonstrate that sediment in the Phase 1 Removal Area is toxic to the range of benthic organisms used in standard sediment toxicity testing. In addition, because the EWW is used by large vessels, there is a potential for these contaminated sediments to be disturbed, leading to their release into the environment in the vicinity of the Phase 1 Removal Area, and transport of these contaminated sediments out of the Phase 1 Removal Area to the rest of the waterway.

The portion of the EWWOU that warrants removal action consists of a total surface area of approximately 20 acres of contaminated marine sediments. The contaminants of concern are certain metals, PCBs, Dieldrin, and DDT. These contaminants are "hazardous substances" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), or constitute "any pollutant or contaminant" that may present an imminent and substantial danger to public health or welfare under Section 104(a)(1) of CERCLA, 42 U.S.C. § 9604(a)(1). Concentrations and analysis of contaminants in the sediments at the EWWOU site are described in the EE/CA.

The presence of hazardous substances at the site, or the past, present, or potential migration of hazardous substances currently located at or emanating from the site, constitute actual and/or threatened "releases" as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

#### 5. NPL status

The Phase 1 Removal Area is located within the boundaries of the East Waterway Operable Unit of the Harbor Island Superfund site, which was listed on the NPL on September 8, 1983.

#### 6. Maps, pictures, and other graphic representations

Relevant figures and tables are attached to this memorandum.

## **B. Other Actions**

### **1. Previous actions**

In 1996, per Section 356 of the 1996 Water Resources Development Act, the Port and the U.S. Army Corps of Engineers started working together to deepen the EWW from its current depth of between -50 and -38 ft MLLW to its federally authorized depth of -51 ft MLLW. Dredging has occurred to the west of the Phase 1 Removal Area and to the North of the area. These actions have removed some contaminated sediment from the waterway.

### **2. Current actions**

The Port is currently planning pier repair work and dredging at T-18, an area directly west of the Phase 1 Removal Area. If the two projects occur simultaneously, water quality monitoring will need to be coordinated between the two projects, and in water activities will need to be monitored to ensure that the two work crews do not get in each others way.

## **C. State and Local Authorities**

### **1. State and local actions to date**

The Washington Departments of Ecology and Natural Resources have participated in reviewing and commenting on documents associated with the EWWOU including those specific to this action.

### **2. Potential for continued State/local response**

The removal action in the EWWOU will be conducted under CERCLA authority, with the state being given the opportunity to provide timely comments on project design documents and work plans. Coordination efforts with state and local authorities will continue throughout the project.

## **III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES**

### **A. Threats to Public Health or Welfare**

At the Phase 1 Removal Area, potential exposure pathways for human health risks include ingestion of contaminated fish and shellfish and dermal exposure to contaminated sediment. Contaminants found in Phase 1 Removal Area sediments are known human carcinogens (e.g., PCBs) and are also known to accumulate in the tissue of fish and shellfish (e.g., mercury and PCBs). These risks have not been quantified in a Human Health Risk Assessment specific to the Phase 1 Removal Area.

## **B. Threats to the Environment**

At the Phase 1 Removal Area, ecological receptors primarily include fish and marine benthic dwelling and burrowing organisms. Benthic and burrowing organisms may be exposed to contaminants from ingestion of contaminated sediment, direct contact with contaminated sediment, and contact with interstitial water associated with contaminated sediment. Bottom feeding fish may also be exposed to contaminants from contact with and ingestion of contaminated sediment. The contaminants of concern (i.e., metals, PCBs) found in sediments in the Phase 1 Removal Area are known to adversely affect aquatic biota, as evidenced by sediment chemical concentrations that exceed the SMS protective criteria (the SQS). As previously noted, The synoptic sediment chemistry and toxicity test results demonstrate that sediment in the Phase 1 Removal Area is toxic to the range of benthic organisms used in standard sediment toxicity testing.

## **IV. ENDANGERMENT DETERMINATION**

Actual or threatened releases of hazardous substances from this site may present an imminent and substantial endangerment to public health, or welfare, or the environment.

## **V. PROPOSED ACTIONS AND ESTIMATED COSTS**

### **A. Proposed Actions**

This non-time-critical removal action for contaminated marine sediments at the Phase 1 Removal Area will be implemented by the Port of Seattle pursuant to an Administrative Order on Consent (AOC). The EE/CA identified three alternatives: No Action (Alternative A), capping the contaminated sediments in the Phase 1 Removal Area (Alternative B), and Dredging and Disposal of contaminated sediments in the Phase 1 Removal Area (Alternative C). The No Action alternative provided a baseline against which other removal action alternatives could be compared.

The following cleanup goal was selected for the action:

The chemical concentrations in the newly exposed surface sediments will be less than the State Management Standards SQS values (the Dredged Material Management Program (DMMP) Screening Level shall be used where there is no SQS value). Final cleanup standards for the waterway will be developed in the ROD and take into account human health risk from bioaccumulative compounds, and TBT uptake.

Consideration of the following factors was critical in the consideration of remedy selection and development:

- Sediment resuspension and or recontamination during the removal action will be minimized by using best management practices (BMPs).

- Consistent with State Hydraulic Code Rules and ESA requirements, dredging and other in-water work cannot occur during identified “fish window” closure periods. The specific dates of these closures will be identified in consultation with the natural resource trustees. It is currently anticipated that dredging will be prohibited between February 14 and August 16.
- Consistent with Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act (CWA), the selected alternative cannot prevent the use of the EWW as a working navigation channel. The Congressionally proposed navigation channel depth of -51 ft mean lower low water (MLLW) must be maintained.
- The removal action will be coordinated with Tribal net-fishing in the EWW.
- If possible, the removal action should begin in 2003.
- To the extent practicable, the removal action will be phased so that a contaminated sediment surface will not be left exposed between the two construction seasons in which the removal action occurs.
- To the extent practicable, the removal action will contribute to the efficient performance of the anticipated remedial action for the EWWOU.

Through stakeholder consensus, and an evaluation of effectiveness, implementability, and costs, Alternative C was selected as the preferred alternative. Although less expensive, the capping remedy (Alternative B) was not implementable as reduction of channel depth would precluded the operations of the EWW as an active shipping channel.

#### 1. Proposed action description

##### Dredging

Approximately 200,000 cy of unsuitable (i.e., contaminated sediments determined to be unsuitable for DMMP open-water unconfined disposal) and approximately 59,000 cy of suitable for DMMP open-water disposal (clean sediment) will be dredged from the EWWOU Phase 1 Removal Area.

Dredging will not occur when the waterway is closed for in water work in order to protect endangered salmonids.

The proposed depth for dredging will be at least -51 ft MLLW to meet waterway navigational requirements plus any additional dredging to meet cleanup requirements. Sediment monitoring during construction would ensure that cleanup objectives were being met. If monitoring indicated that cleanup objectives were not met, an additional foot of dredging followed by placement of a 6 inch layer of sand will be implemented. It is anticipated that the construction would be completed in approximately six months over two construction seasons. During completion of the RI/FS for the EWW, the excavated surface will be evaluated further against the final cleanup levels selected in the ROD for the site, and additional action will be taken if warranted (where sand is placed, the concentration beneath the sand will be evaluated).

##### Disposal of Sediment

The sediment suitable for open-water disposal would be dredged and loaded onto

bottom dump barges for transport and disposal at the Elliott Bay DMMP open-water unconfined disposal site.

Contaminated sediments not suitable for open water disposal will be dredged, dewatered at an upland staging area, and disposed of in an upland landfill.

### Best Management Practices

Chapter 9 of the EE/CA describes the potential Best Management Practices to be employed to ensure that this action is protective of the environment during implementation.

### Performance of long-term monitoring and Recontamination Monitoring

Long-term monitoring will be performed as part of the RI/FS activities at this site. Monitoring of the Phase 1 Removal Area will also be performed specifically to assess whether or not recontamination is occurring.

#### 2. Contribution to remedial performance

The Phase 1 Removal Area is within the boundaries of the EWWOU. The final remedy for this operable unit is not known. However, it may be surmised that further cleanup of the waterway may be required. Removing a large mass of contaminated sediments from the waterway, while ensuring that the continued use of the waterway is not precluded is consistent with the long-term remedial goal for the EWWOU.

#### 3. Description of alternative technologies

No alternative technologies were considered in developing the alternatives for this action.

#### 4. Engineering Evaluation/Cost Analysis (EE/CA)

EPA prepared an EE/CA Approval Memorandum (signed May 6, 2003) for this removal action.

The Port of Seattle prepared the EE/CA, which documents the development and evaluation of removal action alternatives, and discusses the rationale for the recommended alternative. The EE/CA made available for public comment was finalized on July 29, 2003, and a copy of the Executive summary of the EE/CA is provided in Attachment A. A 30-day public comment period on the EE/CA was held, and EPA prepared a response to public comments (see Attachment B).

#### 5. Applicable or relevant and appropriate requirements (ARARs)

For on-site activities, all state and federal ARARs will be complied with to the extent practicable. ARARs are provided as Attachment C. Primary applicable federal ARARs deemed practicable for the removal are the Clean Water Act Sections 311, 312, 401, 404; and Endangered Species Act. Primary applicable state ARARs deemed practicable for the removal are the Washington Sediment Management Standards, Washington Hydraulics Code.

EPA is conducting consultation under Section 7 of the Endangered Species Act. A Biological Assessment is currently under review by National Marine Fisheries Service and the U.S. Fish and Wildlife Service.

Off-site activities will comply with state and federal ARARs, including the Off-Site



Disposal Rule (40 CFR 300.440).

6. Project schedule

The schedule for this removal action is defined in the Scope of Work for the Administrative Order on Consent. The construction phase of this project is expected to run from December 2003 through February 2004, and begin again in August/September 2004 at the end of the fish closure.

B. Estimated Costs

The removal action is being implemented by the Port of Seattle. Projected costs to implement this non-time-critical removal action are estimated at \$17 million. Estimated costs for the Alternative B described in the EE/CA were \$5 million (See Section 7 of the EE/CS). Cost breakdown for both alternatives are provided in Attachment D.

**VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN**

If the action is delayed or not taken, contamination will continue to adversely affect the environment. Delayed action will increase environmental risks through prolonged exposure to bioaccumulative and acutely toxic contaminants present in the sediments. Contaminated sediments in the Phase 1 Removal Area may be transported downstream through erosional processes such as propeller wash, potentially increasing risks to the environment.

**VII. OUTSTANDING POLICY ISSUES**

There are no outstanding policy issues at this site.

**VIII. COMMUNITY RELATIONS**

The EE/CA for the EWWOU Phase 1 Removal Area was made available for public review and comment from August 3 to September 2, 2003. Notice of this comment period was published in the Seattle Times prior to the start of the comment period. Additionally, notice of the comment period and a summary of the proposed EE/CA alternatives were described in a Superfund Fact Sheet which was mailed to approximately 200 people, and information was posted on the EPA Web site.

An Administrative Record was prepared for this action and notice of availability of that record was published in the newspapers and the Superfund Fact Sheet. The Administrative Record was available at EPA.

EPA received one comment letter during the public comment period. The letter was submitted by the consultant for Seattle Iron and Metals, a company which formerly operated a scrap yard and metals recovery facility on Harbor Island. EPA responded to the comment letter in the Responsiveness Summary (included as Attachment B).

## IX. ENFORCEMENT

This removal action will be implemented by the Port of Seattle, pursuant to an Administrative Order on Consent. It is anticipated that the order will be issued in September 2003. The order describes the environmental work to be performed for remediation of the contaminated sediments at the site.

## X. RECOMMENDATION

This decision document represents the selected removal action for the EWWOU Phase 1 Removal Area located within the boundaries of the Harbor Island Superfund site, Seattle, Washington, developed in accordance with CERCLA as amended, and the NCP. This decision is based on the administrative record for the site.

Conditions at the site meet the NCP Section 300.415(b)(2) criteria for a removal and I recommend your approval of the proposed removal action. Oversight costs will come out of the Regional Removal allowance. Estimated costs are \$25,000 for 2003, \$50,000 for 2004 and \$25,000 for 2005.

 29 Sept. 2003

Approved

date

Disapproved

date

## **List of Figures, Tables, and Attachments**

### **Figures**

Figure 1	Vicinity Map
Figure 2	Site Map showing Phase 1 Removal Area
Figure 3	CLS exceedance factors for 0-4 feet.
Figure 4	CSL toxicity test failures locations

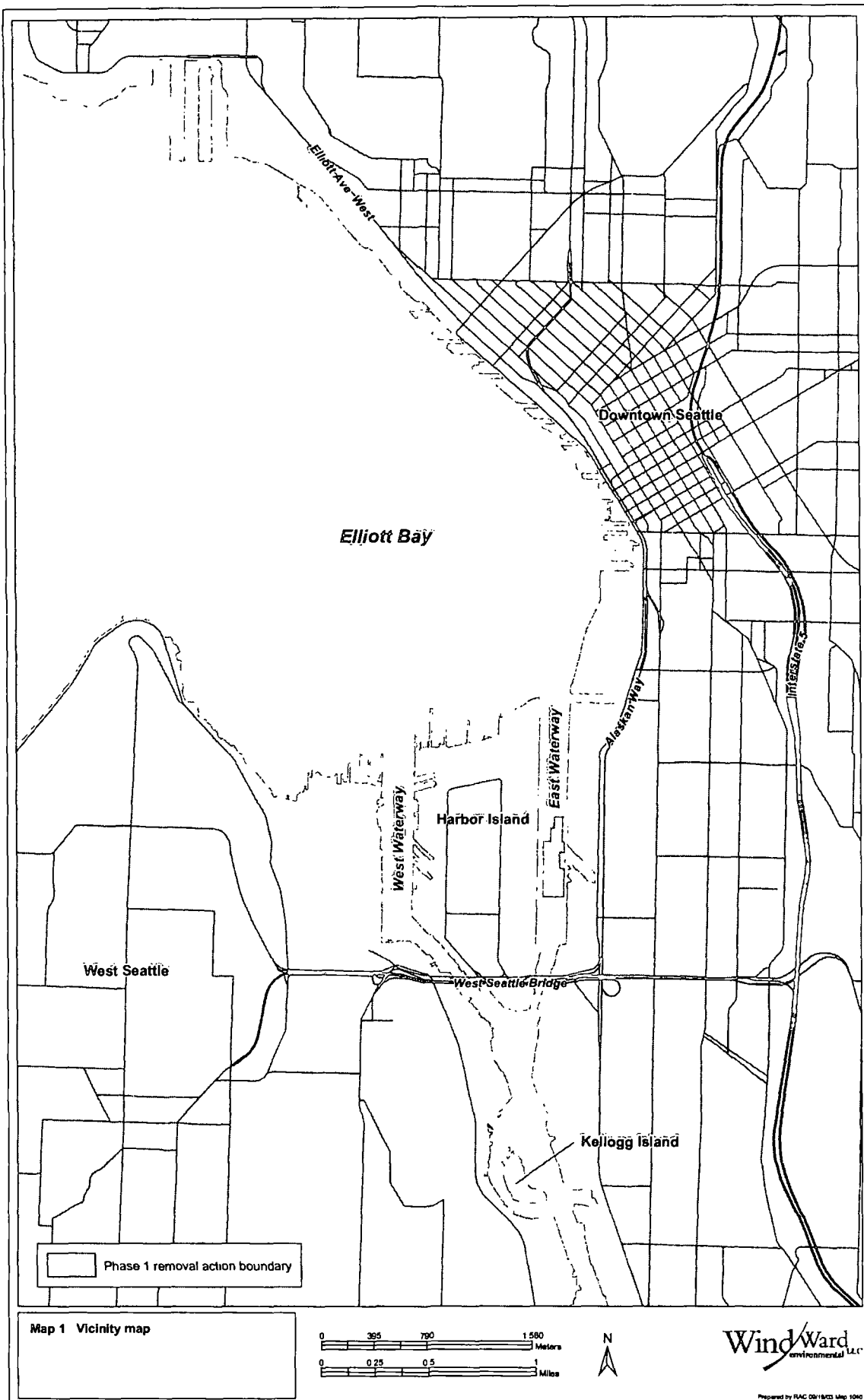
### **Tables**

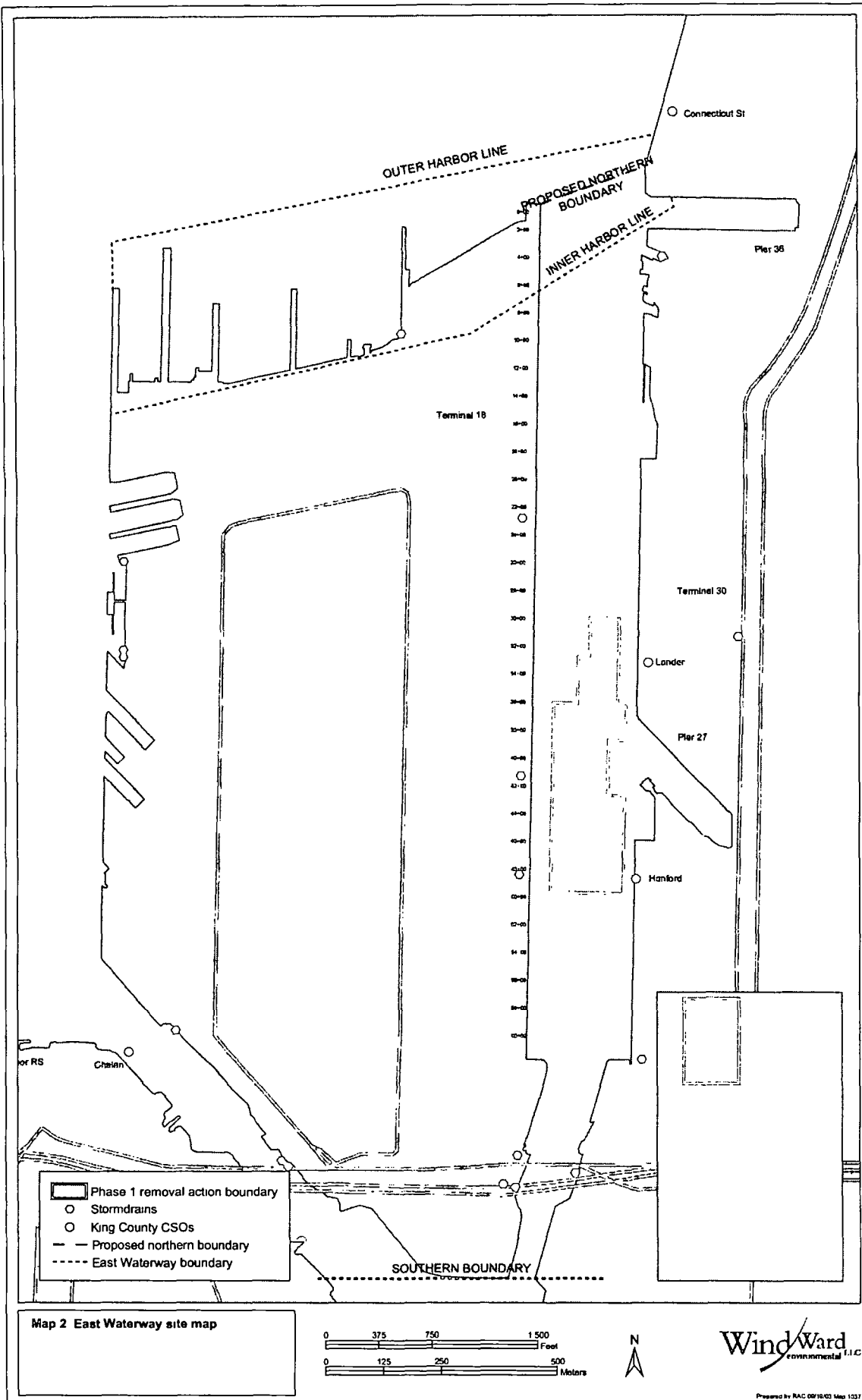
Table 1	Number of CSL exceedances in 0-15 cm sediment
Table 2	Number of CSL exceedances in 0-4 ft sediment
Table 3	Toxicity test results compared to SMS

### **Attachments**

Attachment A	Executive Summary for the Engineering Evaluation/Cost Analysis, East Waterway Operable Unit, Harbor Island Superfund Site
Attachment B	Responsiveness Summary for Public Comments on the Engineering Evaluation/Cost Analysis, East Waterway Operable Unit, Harbor Island Superfund Site
Attachment C	Cost Estimates for Removal Action Alternatives
Attachment D	ARARs and TBCs (reproduced herein from the EE/CA)

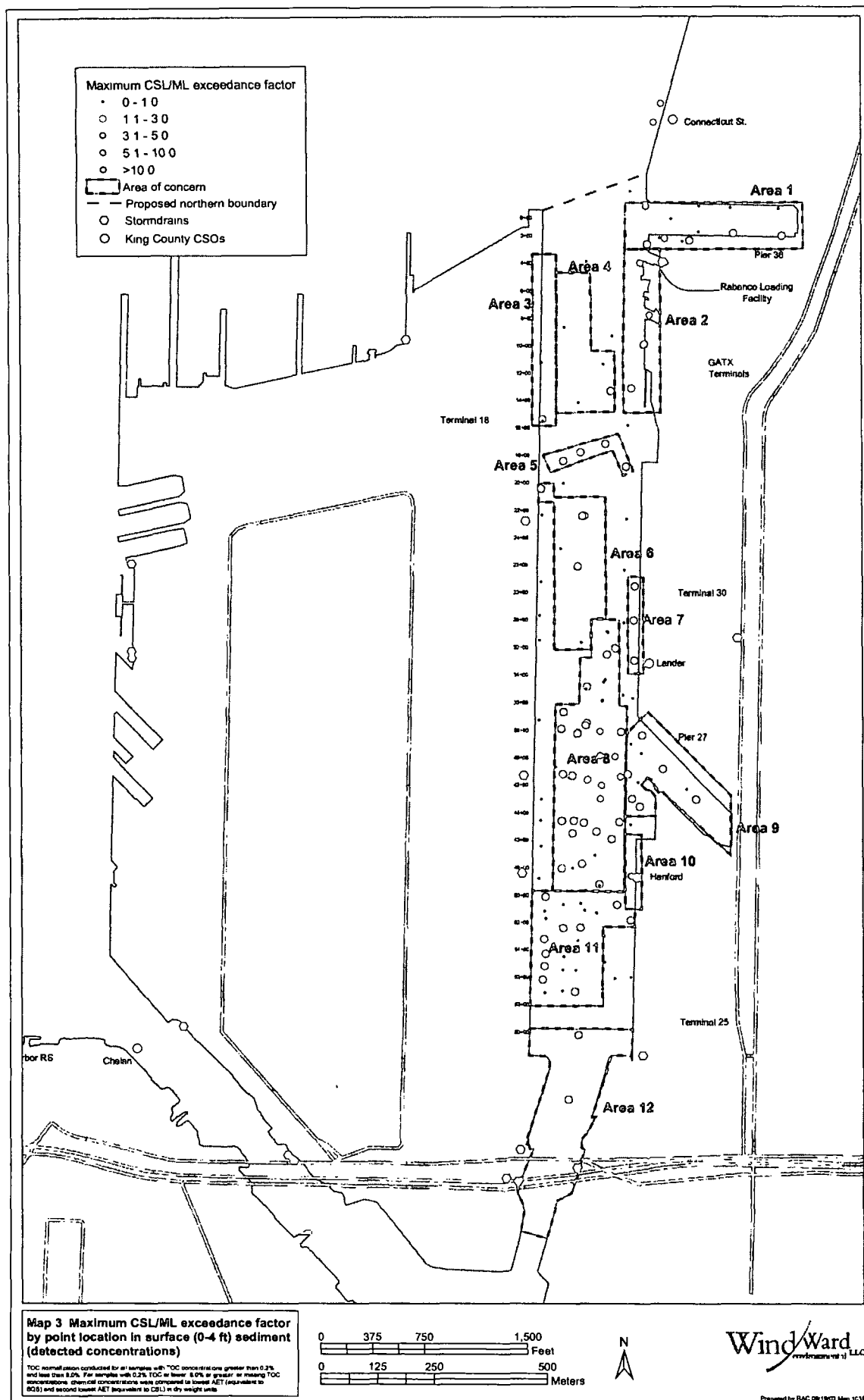
## **Figures**

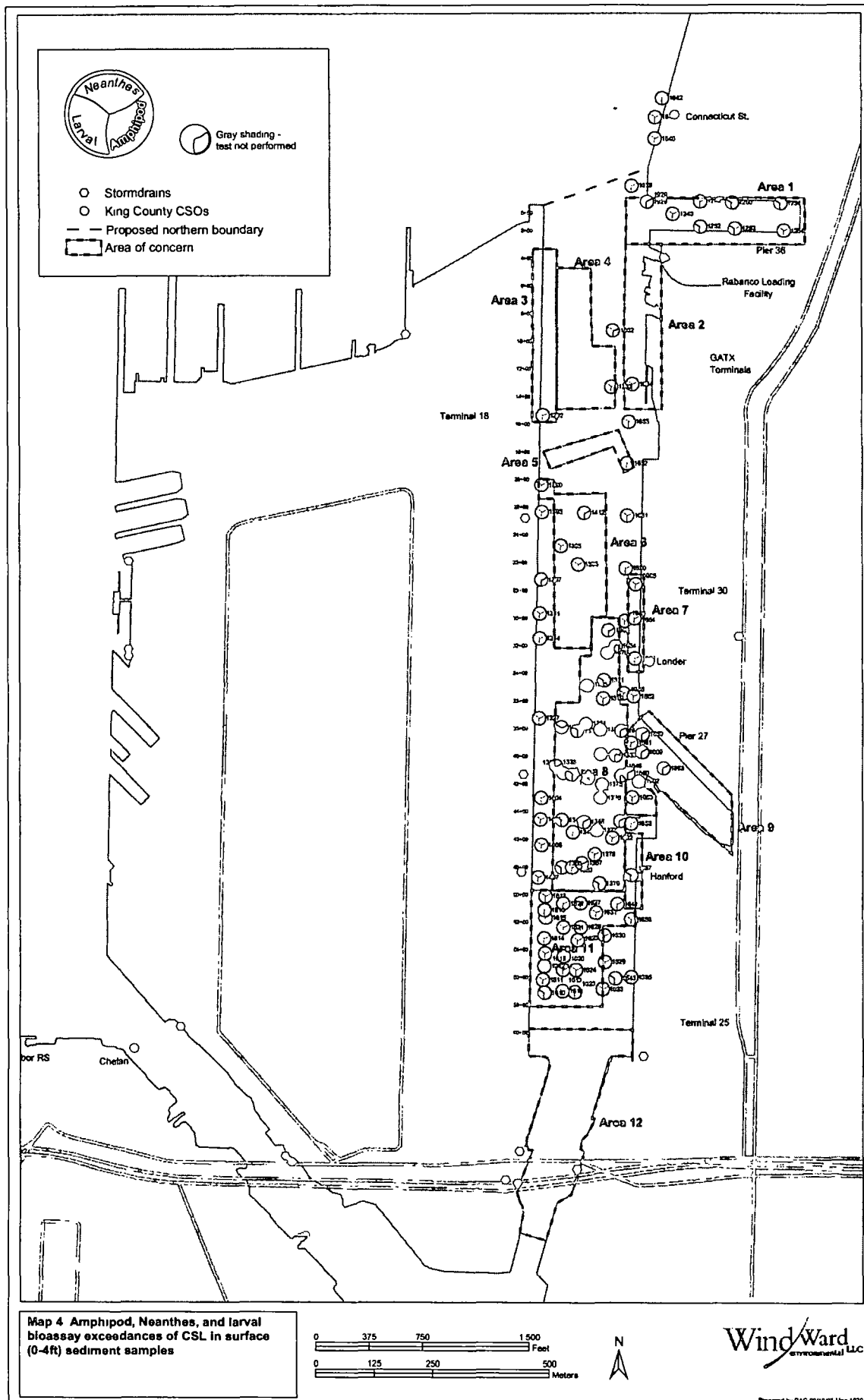




Map 2 East Waterway site map

Windward  
environmental  
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## **Tables**

**Table 1: Number of CSL exceedances in 0-15 cm sediment**

CHEMICAL	NUMBER OF SQS EXCEEDANCES	MIN EF	MAX EF
1,2,4-Trichlorobenzene	4	8.6	37
1,2-Dichlorobenzene	4	8.8	29
1,4-Dichlorobenzene	2	3.7	3.8
2,4-Dimethylphenol	6	1.8	28
2-Methylphenol	4	6.3	13
Acenaphthylene	1	1.0 <sup>a</sup>	1.0 <sup>a</sup>
Bis(2-ethylhexyl)phthalate	3	1.4	6.0
DDTs (total-calc'd)	1	1.6	1.6
Dibenzo(a,h)anthracene	3	1.0 <sup>a</sup>	2.0
Dibenzofuran	1	1.1	1.1
Diethyl phthalate	1	6.0	6.0
Dimethyl phthalate	2	1.2	2.8
Hexachlorobenzene	4	6.3	29
Hexachlorobutadiene	4	3.7	11
Mercury	4	1.3	7.1
N-Nitrosodiphenylamine	4	3.0	11
PCBs (total calc'd)	3	1.2	2.1
Pentachlorophenol	4	1.4	2.9
Phenol	2	1.3	1.3

<sup>a</sup> Value is >1.0, but is reported as 1.0 to follow significant figure rules

**Table 2 Number of CSL exceedances in 0-4 ft sediment**

CHEMICAL	NUMBER OF SQS EXCEEDANCES	MIN EF	MAX EF
1,4-Dichlorobenzene	2	1.9	2.8
2,4-Dimethylphenol	14	1.2	3.3
2-Methylnaphthalene	2	1.2	1.4
2-Methylphenol	6	1.0 <sup>a</sup>	1.5
Benzoic acid	2	1.4	1.5
Benzyl alcohol	7	1.0 <sup>a</sup>	1.6
Bis(2-ethylhexyl)phthalate	12	1.0 <sup>a</sup>	3.3
Cadmium	3	1.1	1.2
DDTs (total-calc'd)	21	1.0 <sup>a</sup>	4.4
Ethylbenzene	2	1.2	1.3
Hexachlorobenzene	4	1.0 <sup>a</sup>	1.3
Lead	1	1.2	1.3
Mercury	23	1.0 <sup>a</sup>	22
PCBs (total calc'd)	20	1.0 <sup>a</sup>	3.6
Silver	3	1.4	2.0
Xylene (total)	2	1.1	1.8

<sup>a</sup> Value is >1.0, but is reported as 1.0 to follow significant figure rules

**Table 3 Toxicity test results compared to SMS**

Survey	Sample ID	Amphipod Absolute Mortality	Mortality % Difference From REF	SQS	CSL	Neanthes Percent of REF GR %	SQS	CSL	Larval NCMA % Difference from REF	SQS	CSL	Overall SQS	CSL
0-15 cm													
HIRI 1995	HI-EW-04	41	6.3	Fail	Pass	104.1	Pass	Pass	14.9	Pass	Pass	Fail	Pass
HIRI 1995	HI-EW-05	34	-7.6	Fail	Pass	99.2	Pass	Pass	15.2	Fail	Pass	Fail	Fail
KC CSO 96	L9553-6	37	16	Fail	Pass	79.5	Pass	Pass	13.8	Pass	Pass	Fail	Pass
0-4 ft													
EW Channel Deep	S23	11	0	Pass	Pass	107.9	Pass	Pass	29.5	Fail	Pass	Fail	Pass
EW Channel Deep	S25	10	4	Pass	Pass	36.5	Fail	Fail	21.8	Fail	Fail	Fail	Fail
EW Channel Deep	S36	14	8	Pass	Pass	16	Fail	Fail	74.4	Fail	Fail	Fail	Fail
EW Channel Deep	S38	12	3	Pass	Pass	32.5	Fail	Fail	47.2	Fail	Fail	Fail	Fail
T-18 Phase 1	1C27	57	48	Fail	Fail	11	Fail	Fail	54	Fail	Fail	Fail	Fail
T-18 Phase 1	1C31	45	38	Fail	Fail	68	Fail	Pass	39	Fail	Fail	Fail	Fail
T-18 Phase 1	1C32	69	68	Fail	Fail	12	Fail	Fail	21	Fail	Pass	Fail	Fail
T-18 Phase 1	1C33	61	60	Fail	Fail	20	Fail	Fail	70	Fail	Fail	Fail	Fail
T-18 Phase 1	1C36	44	36	Fail	Fail	84	Pass	Pass	40	Fail	Fail	Fail	Fail
T-18 Phase 1	1C37	46	35	Fail	Fail	42	Fail	Fail	96	Fail	Fail	Fail	Fail
T-18 Phase 1	1C38	54	53	Fail	Fail	26	Fail	Fail	18	Fail	Pass	Fail	Fail
T-18 Phase 1	1C39	61	60	Fail	Fail	11	Fail	Fail	78	Fail	Fail	Fail	Fail
T-18 Phase 1	1C43	33	22	Pass	Pass	102	Pass	Pass	54	Fail	Fail	Fail	Fail
T-18 Phase 1	1C44	32	25	Pass	Pass	89	Pass	Pass	10	Pass	Pass	Pass	Pass
T-18 Phase 1	1C45	35	28	Fail	Pass	17	Fail	Fail	90	Fail	Fail	Fail	Fail
T-18 Phase 1	1C49	30	8	Pass	Pass	87	Pass	Pass	32	Fail	Fail	Fail	Fail
T-18 Phase 1	1C50	27	20	Pass	Pass	76	Pass	Pass	1	Pass	Pass	Pass	Pass
T-18 Phase 1	1C51	32	31	Fail	Fail	56	Fail	Pass	4	Pass	Pass	Fail	Fail
T-18 Phase 1	2C10	39	31	Fail	Fail	50	Fail	Pass	27	Fail	Pass	Fail	Fail
T-18 Phase 1	2C11	55	46	Fail	Fail	4	Fail	Fail	98	Fail	Fail	Fail	Fail
T-18 Phase 1	2C12	33	24	Pass	Pass	63	Fail	Pass	40	Fail	Fail	Fail	Fail
T-18 Phase 1	2C13	7	-9	Pass	Pass	94	Pass	Pass	3	Pass	Pass	Pass	Pass
T-18 Phase 1	2C14	70	62	Fail	Fail	0	Fail	Fail	88	Fail	Fail	Fail	Fail
T-18 Phase 1	2C15	62	54	Fail	Fail	0	Fail	Fail	89	Fail	Fail	Fail	Fail
T-18 Phase 1	2C16	74	66	Fail	Fail	0	Fail	Fail	89	Fail	Fail	Fail	Fail
T-18 Phase 1	2C17	69	68	Fail	Fail	0	Fail	Fail	96	Fail	Fail	Fail	Fail
T-18 Phase 1	2C18	49	38	Fail	Fail	0	Fail	Fail	94	Fail	Fail	Fail	Fail
T-18 Phase 1	2C19	27	10	Pass	Pass	122	Pass	Pass	9	Pass	Pass	Pass	Pass
T-18 Phase 1	2C20	32	21	Pass	Pass	88	Pass	Pass	41	Fail	Fail	Fail	Fail
Recency	EW-S2-COMP-9	77	58	Fail	Fail	92	Pass	Pass	14.7	Pass	Pass	Fail	Fail
Recency	EW-S2-COMP-10	52	33	Fail	Fail	102	Pass	Pass	9.3	Pass	Pass	Fail	Fail
Recency	EW-S2-COMP-11	80	61	Fail	Fail	85	Pass	Pass	38.7	Fail	Pass	Fail	Fail

GR - individual growth rate (mg/day/worm)

NCMA - normalized combined percent mortality and abnormality

REF - reference sample

## **Attachments**

## **Attachment A: EE/CA Executive Summary**

### **Executive Summary**

The US Environmental Protection Agency (EPA) has ordered the Port of Seattle (Port) to address sediment contamination issues in the East Waterway (EWW) Operable Unit (OU) of the Harbor Island Superfund site per the process defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Superfund. As part of this process, the Port is conducting a remedial investigation/feasibility study (RI/FS) that will ultimately lead to an EPA Record of Decision (ROD) outlining cleanup actions to address threats to human health and the environment in the EWW. Based on a review of initial data collected, EPA has determined that a non-time-critical removal action (NTCRA) is warranted for a portion of the EWW. This NTCRA, termed in this document as the "Phase 1 Removal Action," covers approximately 20 acres in the southern portion of the EWW. Cleanup of the remainder of the EWW will be addressed in Phase 2 through either additional NTCRAs and/or a phased Remedial Design/Remedial Action (RD/RA).

#### **Site Characterization and Risk Assessment**

A total of 64 sediment samples and 35 toxicity samples have been collected from the 0-15 cm and 0-4 ft sediment depth horizons to characterize the sediments within the Phase 1 Removal boundary (referred to herein as the Phase 1 Removal area). Sediment chemistry concentrations in the Phase 1 Removal area exceeded sediment management standards for multiple chemicals, with several chemicals having Exceedance Factors greater than 10 times their respective cleanup screening level standards. The chemicals with the greatest number of exceedances are mercury, total PCBs, dieldrin and total DDTs. In addition, toxicity testing of sediments clearly showed both lethal and sublethal effects in benthic test organisms.

The synoptic sediment chemistry and toxicity test results demonstrate that sediment in the Phase 1 Removal area is toxic to the range of benthic organisms used in standard sediment toxicity testing. Based on these results, which form the basis for the risk evaluation, the Phase 1 Removal area meets the National Contingency Plan (NCP) criteria for conducting a Removal Action. Furthermore, the Phase 1 Removal Action is supported by the qualitative HHRA which identified that this action will indirectly reduce exposure to humans by removing sediment containing bioaccumulative chemicals that are found in seafood. Specifically, the Phase 1 Removal Action will take out a substantial quantity of sediment containing high concentrations of PCBs in the EWW.

#### **Scope, Goals, and Objectives of the Removal Action**

This NTCRA will clean up sediments within the selected Phase 1 Removal area. The goal of this action is to reduce exposure of ecological receptors to sediment contamination, and thereby reduce or eliminate adverse effects on biological resources in the Phase 1 Removal area.

Although the potential risk to human receptors has not been estimated at this time, the action will reduce potential risks to human health by removing bioaccumulative chemicals that are found in sediment. Human health risks for the entire EWW OU will ultimately be addressed in the ROD.

Based on the existing ecological and human health risk evaluation (as summarized in Section 3.0), the following removal action objective (RAO) was developed for the Phase 1 Removal area:

Reduce the concentrations of contaminants in sediments to below the cleanup standards (defined in Section 4.4, below) in the biologically active zone (0–10 cm)

The following applicable or relevant and appropriate requirements (ARARs) and other critical factors are of primary importance in the selection and implementation of the removal action:

- ♦ Sediment resuspension and or recontamination during the removal action will be minimized by using best management practices (BMPs).
- ♦ Consistent with State Hydraulic Code Rules and Endangered Species Act (ESA) requirements, dredging and other in-water work cannot occur during identified “fish window” closure periods. The specific dates of these closures will be identified in consultation with the natural resource trustees. It is currently anticipated that dredging will be prohibited between February 14 and August 16.
- ♦ Consistent with Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act (CWA), the selected alternative cannot prevent the use of the EWW as a working navigation channel. The Congressionally directed navigation channel depth of -51 ft mean lower low water (MLLW) must be maintained.
- ♦ The removal action will be coordinated with Tribal netfishing in the EWW.
- ♦ If possible, the removal action should begin in 2003.
- ♦ The removal action will be phased so that a contaminated sediment surface will not be left exposed between the two construction seasons in which the removal action occurs.
- ♦ To the extent practicable, the removal action will contribute to the efficient performance of the anticipated remedial action for the EWW OU.

### **Identification of Removal Action Alternatives**

Candidate technologies for the removal action were identified and screened in order to select the preferred alternative for design and implementation. This section provides a brief description of each of the alternatives considered.

The no-action alternative provides a baseline against which the other removal action alternatives are compared. In this alternative, the sediments would be left in place, and neither dredging nor capping would be implemented in the Phase 1 Removal area.

The *in situ* capping alternative consists of placing an isolation cap composed predominantly of fine sands over the contaminated sediments within the Phase 1

Removal area. An Isolation Cap forms a surface barrier to physically isolate the contaminated sediments from the aquatic environment.

The dredging and disposal alternative consists of dredging approximately 200,000 cubic yards (cy) of contaminated sediments and approximately 59,000 cy of sediment suitable for open-water disposal according to Dredged Material Management Program (DMMP) guidelines<sup>1</sup>. Three potential options for disposal of the Phase 1 contaminated sediment were considered for this alternative and were compared for feasibility based on the Phase 1 Removal action schedule goal and objectives: confined aquatic disposal (CAD), nearshore confined disposal facility (NCDF), and upland landfill disposal. The upland landfill disposal option was selected as the preferred disposal option for the Phase 1 Removal action.

## **Recommendations**

The Engineering Evaluation/Cost Analysis (EE/CA) identified three removal alternatives: no action, capping, and dredging and disposal. Based on the EE/CA evaluation, dredging and disposal was identified as the preferred removal action alternative for the Phase 1 Removal area. Dredging and disposal ranked high in effectiveness (reduction in risk), high in implementability (technical feasibility), and would cost the most of the three alternatives. The no-action alternative ranked low in effectiveness at achieving the objectives of the removal action and was rejected. The *in situ* capping option ranked medium in effectiveness due to long-term uncertainty about meeting all of the cleanup objectives, low in implementability due to institutional factors, and medium in cost relative to the other two alternatives.

Dredging and disposal would remove a substantial quantity of sediment that has been determined through chemical and toxicity testing to be toxic to the range of benthic organisms used in standard sediment toxicity testing. Removal of the proposed sediment horizon will reduce risk to both ecological and human receptors, meeting the goals and objectives of the removal action.

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<sup>1</sup> DMMP is administered by the USACOE



## **Attachment B: Responsiveness Summary for Public Comments on the Engineering Evaluation/Cost Analysis East Waterway Operable Unit, Harbor Island Superfund Site Seattle, WA**

**September 22, 2003**

The purpose of this document is to summarize and respond to the public comments submitted on the Engineering Evaluation/Cost Analysis (EE/CA) for the East Waterway Operable Unit Harbor Island Superfund Site, Seattle, Washington. A removal action at the site will be performed pursuant to an Administrative Order on Consent between the U.S. Environmental Protection Agency (EPA) and the Port of Seattle (Respondent).

The EE/CA was made available for public review and comment from August 3 to September 2, 2003. Notice of this comment period was published in the Seattle Times prior to the start of the comment period. Additionally, notice of the comment period and a summary of the proposed EE/CA alternatives were described in a Superfund Fact Sheet which was mailed to approximately 200 people, and information was posted on the EPA Web site.

An Administrative Record was prepared for this action and notice of availability of that record was published in the newspapers and the Superfund Fact Sheet. The Administrative Record was available at EPA.

EPA received one comment letter during the public comment period. The letter was submitted by the consultant for Seattle Iron and Metals, a company which formerly operated a scrap yard and metals recovery facility on Harbor Island. EPA responded to the comment letter (see "Responsiveness Summary" included as Attachment B).

### **General Comments**

**1. The non-time critical removal is not compliant with the NCP, not cost effective, and not necessary, based on the evaluation of ecological and human health risks presented in the EE/CA. It appears that the proposed sediment dredge depth and volume are being primarily driven by navigational requirements and needs.**

Response: The proposed non-time critical removal will remove a large volume of sediment with contaminant concentrations above cleanup standards that has also been shown to be toxic in sediment bioassay testing. The sediment chemistry and bioassay data for the deepest sediments (greater than 4 ft) were inadvertently omitted from the EE/CA. These data are presented in the final Data Summary Report (Windward 2003) which is part of the Administrative Record for this action.

The removal action has not been primarily driven by navigational requirements. However, the selected removal action was required to be consistent with Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act and cannot prevent

the use of the EWW as a working navigational channel, including access to side channel berths dredged to -51 MLLW.

- 2. The analysis of sediment dredging presented in the EE/CA is not compliant with the Guidance for Conducting Non-Time-Critical Removal Actions under CERCLA. The EE/CA should provide definitive information on the source, nature, and extent of contamination, and risks presented at the site.**

Response: The EE/CA is consistent with the referenced guidance. The EE/CA provides definitive information on the nature and extent of contamination and the ecological risks presented at the site. Documents including a Data Summary Report (Windward 2003) and the Boundary Memo (EE/CA Appendix A) provide additional detailed information on the nature and extent of contamination. Future documents prepared for this site's RI/FS and/or additional EE/CAs (termed Phase II) will provide a final comprehensive evaluation of source, nature and extent of contamination, and human and ecological risks presented at the site.

- 3. The proposed dredge volume is not supported based on the lack of human health risk calculations, documented benthic impacts, or ARARs.**

Response: The proposed dredge volume is supported by exceedances of sediment ARARs as well as failed sediment bioassays throughout the sediment proposed for dredging. The chemistry and bioassay data for the greater than 4 ft sediment horizon were inadvertently omitted from the EE/CA and are presented in the final Data Summary Report (Windward 2003). A human health risk assessment was conducted for the consumption of seafood from the East Waterway as part of the HHRA for the Waterway Sediment Operable Unit (ESG 1999). Risk and hazard estimates for total PCBs were high enough to suggest that remedial action may be warranted in the EWW. However, as stated in the EE/CA, human health risks were not used as the justification for this action.

- 4. The benthic impact evaluation that is presented and applied is flawed and not applicable. The analysis is inconsistent with ARARs, including Washington's Sediment Management Standards.**

Response: The benthic impact evaluation is consistent with Washington SMS standards. A more detailed discussion of this issue is found in the response to the specific comment on this issue in the following section.

- 5. There should be a brief discussion of historical dredging within the East Waterway. In particular, it would be of interest to know whether there has ever been dredging to the targeted depth (-51 ft MLLW). It is important to know whether sediments below the proposed dredge prism represent native materials. If they do, contaminants in samples from those depths may represent cross-contamination from shallower layers within the sediment cores. Therefore, contamination of the subsurface layer (more**

**than 4 ft below the sediment-water interface but above an elevation of -51 ft MLLW) (and the volumes requiring confined disposal) could be overestimated if similar cross-contamination could have occurred in samples from those depths.**

Response: The East Waterway west and north of the Phase 1 Removal Area has been previously dredged to -51 feet. Sampling was conducted per Dredged Material Management Program (DMMP) procedures; cross-contamination between surface and subsurface DMMP is unlikely since the compositing methods specified by DMMP are intended to avoid cross-contamination.

- 6. There is insufficient information presented in the draft EE/CA to understand the basis for identifying 200,000 cy as requiring upland disposal and 59,000 cy as being suitable for open-water disposal. Additional detail needs to be added to this document, or other documents should be referenced where this information can be found. In particular, although 29 "subsurface" sediment samples (more than 4 ft below the sediment-water interface but above an elevation of -51 ft MLLW) were said to have been collected (Table 2-2), there is no discussion in the EE/CA of the results of analysis of those samples, nor is there reference to other reports where that information can be found.**

Response: The chemistry and bioassay data for the greater than 4 ft sediment horizon were inadvertently omitted from the EE/CA. The data is presented in the final Data Summary Report (Windward 2003). The report is part of the Administrative Record for this Removal Action.

- 7. If sediments proposed for open-water disposal have chemical concentrations above the DMMP SLs, they must undergo toxicity testing to determine their suitability for such disposal. The 59,000 cy slated for open-water disposal are very likely to have exceedances of the DMMP SLs, but there is no mention of any toxicity testing that may have been conducted on these sediments. Similarly, if sediments proposed for open-water disposal have chemical concentrations above the DMMP bioaccumulation triggers, they must undergo bioaccumulation testing to determine their suitability for such disposal. There is no discussion of whether there are any exceedances of the DMMP bioaccumulation triggers, and whether any bioaccumulation testing has been conducted to determine the suitability of the 59,000 cy for open-water disposal.**

Response: The sediment slated for open-water disposal underwent a complete DMMP evaluation including sediment bioassays and bioaccumulation testing. These sediments were characterized as part of the T-18 sediment characterization (EVS 1998) and the East Waterway channel deepening sediment characterization (SAIC 1999). The complete sediment chemistry and bioassay data set is presented in the final Data Summary Report (Windward 2003).

**8. No post-construction performance standards have been developed. Therefore, it is not apparent whether the chemical concentrations in the post-construction surface will be required to be below SQS, below CSL, or some other criteria, or what the consequences will be if these criteria are not met. Analysis of sediment samples collected from the strata immediately below the proposed dredge prism is not an accurate predictor of the exposed sediment conditions because there is invariably some residual material left behind when the overlying strata are removed via clamshell dredging.**

Response: Section 4.4 of the EE/CA states that the SQS is the cleanup standard for this action.

**9. A discussion needs to be added of the differences between the chemical criteria of the Washington Sediment Management Standards (SQS and CSL) and the Dredged Material Management Program (SL and ML). The two sets of criteria are treated as if they are the same, but the regulatory implications are quite different. Although it may be appropriate to compare the concentrations of chemicals that do not have SQS or CSL values to the SL and ML values, exceedance of the latter values does not have the same interpretation as exceedance of the former values. The DMMP SL and ML chemical criteria apply only to evaluation of disposal options.**

Response: The regulatory context for these criteria could have been explained more clearly. The use of SL and ML values for chemicals with no SQS or CSL values is a commonly used approach to ensure that the maximum possible number of chemicals is screened. Both sets of values were developed from the same AET database for effects on benthic organisms and can be used for assessing risk to benthic organisms.

**10. The need for dredging sediments greater than 4 ft below the sediment-water interface has not been demonstrated, based on a comparison of sediment characteristics at those depths with the chemical and biological standards in the Washington Sediment Management Standards.**

Response: See response to Comment 6.

**11. Given the lack of documentation currently provided in the EE/CA, we question whether the deficiencies can be addressed only in a Responsiveness Summary; alternatively, revision and reissuance of the EE/CA may be required.**

Response: The Administrative Record for this action provides complete documentation supporting the EE/CA.

### **Specific Comments**

**12. Page ES-3, Recommendations section, first paragraph: The removal alternatives evaluation failed to evaluate, discuss, and rank the potential alternatives based on long- and short-term effectiveness, implementability,**

**and cost, as required by EPA's EE/CA guidance (EPA 1993).**

Response: A comparative analysis of the Phase 1 removal action alternatives is presented in Section 8 of the EE/CA.

- 13. Page ES-3, Recommendations section, second paragraph, first sentence: Insufficient data are presented to determine what the "substantial quantity of sediment" is that is said to be toxic to benthic organisms. In particular, there is no discussion of the characteristics of the sediments lying more than 4 ft below the sediment-water interface but above an elevation of -51 ft MLLW.**

Response: See response to Comment 6.

- 14. Page ES-3, Recommendations section, second paragraph, second sentence: There has been no attempt made to quantify human health risks, and; therefore it is not possible to determine the extent to which human health risk will be reduced.**

Response: The text makes it very clear that no attempt was made to quantify human health risks and that the action is based on ecological risk. A human health risk assessment was conducted for the consumption of seafood from the East Waterway as part of the HHRA for the Waterway sediment Operable Unit (ESG 1999). Risk and hazard estimates for total PCBs were high enough to suggest that remedial action may be warranted in the EWW. The Phase 1 Removal Area sediments contain some of the highest concentrations of these chemicals in the waterway therefore, the removal of these sediments is likely to result in reduced human health risk. A site specific Human Health Risk Assessment will be prepared as part of Phase II of this project.

- 15. Page 1, Section 1.0, second paragraph: EPA's EE/CA guidance (EPA 1993) indicates that the EE/CA should provide definitive information on the source, nature, and extent of contamination, and risks presented by the site, but this EE/CA failed to meet these requirements.**

Response: The EE/CA provides definitive information on the nature and extent of contamination and the risks presented at the site. The ongoing RI/FS for the East Waterway will provide a more comprehensive evaluation of source, nature and extent of contamination, and human and ecological risks presented at the site. However, the existing information was determined to be sufficient to for action to be taken in the Phase 1 Removal Area.

- 16. Page 3, Section 2.1, first paragraph: The cited depths should be minus, relative to MLLW.**

Response: Agreed.

- 17. Page 4, Section 2.2.2: The EE/CA should have provided additional analysis**

**of the potential human health risks associated with seafood consumption from the site. No competent evaluation of human health risk was provided to justify the removal volumes.**

Response: The removal is justified on the basis of the risk posed to ecological receptors. A human health risk assessment was conducted for the consumption of seafood from the East Waterway as part of the HHRA for the Waterway sediment Operable Unit (ESG 1999). Risk and hazard estimates for total PCBs were high enough to suggest that remedial action could be warranted in the EWW.

- 18. Page 8, Section 2.5.1.1, Tables 2-3 and 2-4: These two tables provide insufficient physical data to fully evaluate the dredging alternatives. Additional data such as moisture content, shear strength, and plasticity should be provided. No discussion or evaluation is provided to determine the depositional history (erosional versus depositional), and, therefore, the No Action Alternative cannot be fully evaluated.**

Response: Blowcount information is typically used by Contractors to determine dredgability. Relative density information from the DMMP characterization (Terminal 18 Sediment Characterization Sampling and Analysis Results Report; EVS 1998) will be provided to the Contractor in the plans and specifications. The available geotechnical data, including blowcounts that have been measured, are considered adequate to evaluate dredging as an alternative, and to design a dredge remedy for the Phase 1 Removal Action.

The East Waterway is considered to be both a depositional and erosional environment, as described in the Harbor Island Remedial Investigation Report (Weston 1993). Two major factors limit the sedimentation load within the East Waterway: the ongoing maintenance by the USACE of the Duwamish River upper turning basin, and the main Duwamish River flow through the West Waterway. These factors, and the fact that neither the Port of Seattle or USACE has performed maintenance dredging within the East Waterway, indicate that present sedimentation rates are relatively low within the East Waterway.

- 19. Page 9, Table 2-5: In this and other similar tables, a distinction should be made between detected values and undetected values. For example, chemicals that were never detected still have minimum and maximum results reported, with no indication that these are, in reality, the minimum and maximum detection limits.**

Response: It is appropriate to use detection limits for the screening of nondetected chemicals for the risk evaluation presented in the EE/CA. However, the distinction could have been clearer in the tables.

- 20. Page 10, Table 2-5: "Pesticides" and "PCBs" in the first column should be in bold type.**

Response: Comment noted.

- 21. Page 12, Table 2-6: "PCBs" in the first column should be in bold type.**

Response: Comment noted.

- 22. Page 15, Section 3.2.1, second paragraph, first sentence: Rephrase sentence to read "Risks to the benthic community were assessed using two ..."**

Response: Comment noted.

- 23. Page 16, Section 3.2.1.1, first paragraph: This is where additional discussion is needed of the SQS/CSL and SL/ML values. The reader needs to understand that they are not strictly interchangeable, and that exceedances of these values have different regulatory interpretations (see general comment above).**

Response: The regulatory context for these criteria could have been explained more clearly. The use of SL and ML values for chemicals with no SQS or CSL values is a commonly used approach to ensure that the maximum possible number of chemicals is screened. Both sets of values were developed from the same AET database for effects on benthic organisms and can be used for assessing risk to benthic organisms.

- 24. Page 16, Table 3-1: In this and similar tables that follow, a distinction needs to be drawn between reported exceedance factors based on detected concentrations and exceedance factors based on detection limits. Furthermore, it is misleading to represent all of these as "SQS exceedances" or "CSL exceedances" because many of the chemicals listed do not have SQS or CSL values. If what is really exceeded is an SL or ML value, either it should be shown in a different column or each chemical with such an exceeded value should be footnoted accordingly. Exceedance of an SL or ML value does not have the same regulatory significance as exceedance of an SQS or CSL value. See comments above and general comments.**

Response: The distinction between detected and non-detected exceedances is clearly presented in the final Data Summary Report (Windward 2003). The regulatory differences between SQS/CSL and SL/ML values are not relevant to the discussion here. For the purposes of assessing risk to benthic organisms the fact that an effects-based standard has been exceeded is the relevant information.

- 25. Page 17, Table 3-2: The second column heading should be "Number of CSL exceedances."**

Response: Comment noted.

26. **Page 18, Table 3-4: The second column heading should be “Number of CSL Exceedances.” The third and fourth column headings should be reversed.**

Response: Comment noted.

27. **Page 20, Section 3.2.1.2, first paragraph, third sentence: There were 35 sediment samples collected within the Phase 1 boundary that were subjected to sediment toxicity testing, not “35 toxicity tests.” Similarly, there were three sediment samples collected from the 0-15 cm horizon that were subjected to sediment toxicity testing, not “3 tests.” These data are insufficient to justify dredging of sediments located below the 0–4 ft (surficial) zone. No toxicity test data are provided for deeper DMMUs.**

Response: 35 sediment samples were submitted for multiple toxicity tests. See also the response to Comment 6.

28. **Page 20, Section 3.2.1.2, first paragraph, next to last sentence: Rephrase to read “... the potential toxicity of Puget Sound sediments.”**

Response: Comment noted.

29. **Page 21, Table 3-5: Under the Sediment Management Standards, to be considered an SQS exceedance, the mean amphipod mortality of a test sediment must be more than 25 percent greater (on an absolute basis, not a relative basis) than the mean mortality of the reference sediment. Similarly, to be considered a CSL exceedance, the mean amphipod mortality of a test sediment must be more than 30 percent greater (on an absolute basis, not a relative basis) than the mean mortality of the reference sediment. The mortality differences from the reference samples reported in the fourth column appear to be relative percentages, rather than absolute percentage differences. Otherwise, it would not be possible for the percentages in the third and fourth columns to sum to more than 100 percent. For example, if the absolute mortality of the test sediment was 57 percent, it would not be possible for the absolute difference in mortality from the reference sediment to be more than 43 percent, because the survival in the reference sediment could not be more than 100 percent. This apparent incorrect interpretation draws into question all of the pass/fail interpretations for the amphipod test. Furthermore, although the three 0-15 cm sediment samples were all indicated to have failed the SQS, this could not possibly be the case because the reported differences from the reference sample were all less than the required 25 percent (absolute), and the second sample apparently had even better survival than the reference sample because the difference in mortality is reported as being negative.**

Response: The description of SQS criteria above is incorrect. An SQS exceedance for the amphipod test requires that the test sediment be statistically different from the



reference sediment and the absolute mortality be greater than 25 percent. The description of a CSL exceedance above is correct.

The mortality differences from the reference sediment are correct in the 4<sup>th</sup> column. If the absolute mortality of a test sediment is 57 then it is possible for the absolute difference in mortality from the reference sediment to be 48 if the reference sediment mortality is 9 percent. There is no reason that these numbers should sum to a number less than 100 percent. The percent mortality values are being compared here, not percent survival. It is true that the percent difference cannot be greater than the absolute mortality as the reference cannot have mortality less than 0 %.

The commentor is incorrect in his understanding of the test criteria. The interpretation presented in the EE/CA is consistent with SMS guidelines.

- 30. Page 23, Section 3.2.2, third paragraph: No data are provided to determine the appropriateness of the assumed seafood consumption rates for harvest from the East Waterway. In particular, there is no mention in the EE/CA of shellfish harvest occurring in the East Waterway. The risks associated with human consumption of seafood containing PCBs are discussed, but there was no attempt made to quantify the relationship between the PCB concentrations in seafood and those in sediments, so there is no way of knowing the extent to which the proposed dredging would reduce these risks. An EE/CA can only provide for a “non-time critical removal action,” and, therefore, there is no justification provided for the extensive dredging proposed as a means of reducing human health risks.**

Response: The text makes it very clear that no attempt was made to quantify human health risks. A human health risk assessment was conducted for the consumption of seafood from the East Waterway as part of the HHRA for the Waterway sediment Operable Unit (ESG 1999). Risk and hazard estimates for total PCBs were high enough to suggest that remedial action could be warranted in the EWW. The Phase 1 removal area sediments contain some of the highest concentrations of these chemicals in the waterway; therefore, the removal of these sediments is likely to result in reduced human health risk.

- 31. Page 24, Section 3.2.3, third paragraph, last sentence: It is not apparent when this “further evaluation” would occur.**

Response: Further evaluation will occur as part of the continuing investigation of the site under CERCLA. Planning for additional sampling of the waterway will begin this fall, and is expected to take place in 2004.

- 32. Page 24, Section 4.1, first sentence: Rephrase to read “This NTCRA will remove contaminated sediments ....”**

Response: Comment noted.

- 33. Page 25, Section 4.2, second paragraph, first sentence: The term “potential risk” is redundant. “Risk” already includes the concept of “potential.” Please remove two occurrences of “potential” from this sentence.**

Response: Comment noted.

- 34. Page 25, Section 4.3: The removal action objective calls for the reduction of chemical concentrations within the biologically active zone (0-10 cm) to below the cleanup standards. Even under the liberal interpretation of “surface” sediments (0-4 ft) used in the EE/CA, the proposed dredging goes far beyond what would be necessary to achieve this objective. The need to remove 259,000 cy of sediments has not been demonstrated. Furthermore, because this removal action is recommended to proceed prior to a demonstration that source control has been sufficiently addressed, additional discussion should be provided of the potential for recontamination of the proposed dredge surface.**

Response: See response to Comment 6.

- 35. Page 25, Section 4.4, second paragraph, first sentence: It is not apparent whether the post-construction cleanup standard is intended to be the SQS or the CSL (see also general comment above).**

Response: See response to Comment 8.

- 36. Page 25, Section 4.4, third paragraph, first sentence: This sentence is not consistent with the data presented in Table 7-2. Furthermore, as indicated in a general comment above, analysis of sediment samples collected from the strata immediately below the proposed dredge prism is not an accurate predictor of the exposed sediment conditions because there is invariably some residual material left behind when the overlying strata are removed via clamshell dredging.**

Response: The SQS exceedances in Table 7-2 are much lower than those in the current sediment surface. The exposed sediment surface will be extensively sampled during post-dredge monitoring to confirm the quality of the new sediment surface.

- 37. Page 26, Section 4.5, fifth bullet: The timing of the removal action (beginning in late 2003) now appears highly unlikely. The lower cost option, nearshore confined disposal, was eliminated from further consideration as a disposal option based on time considerations (see Section 5.4.2). If the removal action is delayed, the nearshore confined disposal option should be retained.**

Response: EPA does not agree that the timing of the Removal Action is highly unlikely.

Nearshore confined disposal will be evaluated as a disposal option during Phase 2.

- 38. Page 28, Section 5.3, first paragraph, second sentence: Because the “cleanup requirements” have not been defined (see general comment above), it is not apparent what is meant by “any additional dredging to meet cleanup requirements.” If, for example, post-construction sediment sampling and analysis revealed chemical concentrations above the SQS, CSL, or any other criteria selected, would that mean that additional dredging would have to occur until those criteria were met?**

Response: See response to Comment 8. Section 5.3 of the EE/CA states “ If monitoring indicated that cleanup objectives were not being met, additional dredging or potential thin-layer capping, and/or modifying contractor operations could be implemented”. The manner in which contingency action will be implemented will be presented in the Removal Design. The post-dredge monitoring plan will be incorporated into the Design documents.

- 39. Page 29, Section 5.4.1, second paragraph, first sentence: It is not apparent why the only possible CAD site would have to be within the East Waterway. For example, the Bremerton Naval Shipyard cleanup utilized a CAD site removed from the area of contaminated sediments.**

Response: Offsite CAD was not considered to be a feasible option for Phase 1 Removal Action by EPA due to site use issues that would need to be resolved. Offsite CAD was preliminarily evaluated for the Port as part of a draft Disposal Site Evaluation report that was prepared for an anticipated Environmental Impact Statement (unpublished) that was not pursued when the East Waterway investigations came under EPA order. CAD disposal was not considered to be implementable in the time frame for this NTCRA.

- 40. Page 30, Section 5.4.2, last paragraph: As indicated in an earlier comment on Page 26, it is not apparent why the additional time necessary to design a NCDF should be the only reason for eliminating this disposal option from further consideration.**

Response: See response to Comment 39.

- 41. Page 31, Section 5.4.3, last paragraph, first sentence: Some additional data (e.g., toxicity characteristic leaching procedure [TCLP]) may be needed, depending on the upland landfill selected.**

Response: Agreed.

- 42. Page 34, Section 7.2.2, second paragraph, fourth sentence: Change “-37” to “-35.”**

Response: Comment noted.

- 43. Page 34, Section 7.3.1, first paragraph, fourth sentence: Because it is apparent that dredging will not begin by the end of 2003, the entire project most likely could be completed in one (longer) construction season (e.g., beginning in late summer 2004).**

Response: EPA disagrees that the timing of the project is highly unlikely. Post-dredge monitoring and contingency actions could require sufficient time following completion of planned dredging that a single (longer) construction season may not be adequate to complete Phase 1.

- 44. Page 35, Table 7-1, and Page 38, Table 7-3: Why are no costs included for engineering and project management? Also, the basis for estimating monitoring costs is not explained.**

Response: Costs for engineering and PM were considered to be similar for each option, and costs were developed to provide a relative comparison.

- 45. Page 36, Section 7.3.2.1, first paragraph: Additional discussion of the potential for recontamination should be added to the EE/CA, especially because the reports cited here are now 7 years old.**

Response: Recontamination will be completely discussed in the Removal Design documents, and will be further evaluated during the remainder of the site investigation.

- 46. Page 36, Section 7.3.2.1, second paragraph, third sentence: When will the "Remedial Design report for the Phase 1 Removal action" be prepared?**

Response: The Removal Design will be placed in the site file when it is completed in the fall of 2003.

- 47. Page 36, Section 7.3.2.2, second paragraph: As indicated in a general comment above, it would be of interest to know whether the sediments represented in these samples have ever been exposed, or whether they represent native sediments. If they are indeed native sediments and have not previously been exposed through historical dredging, a discussion should be added of how the chemical contaminants might have been introduced into these sediments (e.g., could the results represent "smearing" of the contaminants from higher elevations within the core tube?).**

Response: It is not clear if the sediments are native or depositional, as described in the previous response regarding historical dredging in the EWW. Cross-contamination or "smearing" is unlikely since sampling methodology followed DMMP characterization procedures.

- 48. Page 37, Section 7.3.2.2, last paragraph, next to last sentence: The maximum SQS EF for total PCBs is said to be 1.8, although the maximum**

**SQS EF in Table 7-2 is 5 (Sample EW-146-03).**

Response: The table is correct and the text should be changed.

- 49. Page 37, Table 7-2: The SQS EF values for total DDT in Samples EW-145-01 and EW-145-02 reported in this table are not consistent with the values reported in Map 24.**

Response: The values in the table are correct and the map values should be updated.

- 50. Page 38, Table 7-3, notes below table: The PSDDA (Puget Sound Dredged Disposal Analysis) Program is now called the DMMP (Dredged Material Management Program). Also, there is reference to “previously calculated DMMUs [dredged material management units]” but no indication of where the calculation of DMMUs has been documented. This is critical to an understanding of the adequacy of sampling and analysis of the sediments proposed for dredging and the identification of the volumes of sediments for upland and open-water disposal.**

Response: The sediment in the removal area underwent a complete DMMP evaluation including sediment bioassays and bioaccumulation testing. These sediments were characterized as part of the T-18 sediment characterization (EVS 1998) and the East Waterway channel deepening sediment characterization (SAIC 1999).

- 51. Page 44, Section 9.5: There is no discussion of what will happen if post-construction monitoring indicates that the sediment quality objectives are not met.**

Response: See Comment response 38.

- 52. Pages 54 and 55, Appendix A, Table A-2-1: The CSL for LPAH is 780 mg/kg OC, not 170 mg/kg OC. Two lines are included for trichloroethene; the second line should be tetrachloroethene. Other chemicals for which there are DMMP values but which do not appear in this table include lindane, ethylbenzene, and total xylene.**

Response: Comment noted.

- 53. Page 57, Appendix A, Table A-3-1, Area 8: In the 0-15 cm samples, there were other chemicals that exceeded the CSL (see Table 3-2); why aren't they listed here? In the 0-4 ft samples, zinc is indicated as having exceeded the CSL, although it did not (see Table 3-4), and 2,4-dimethylphenol is said to have exceeded the CSL, although it was never detected (see Table 2-6).**

Response: The Removal Boundaries Memo (Appendix A) only reported exceedances

due to detected chemical concentrations. The chemicals in Table 3-2 that were not reported in Appendix A reflect non-detected exceedances. The inclusion of zinc and 2,4-dimethyl phenol in Appendix A was due to differences in the boundaries of Area 8 discussed in Appendix A and the Phase 1 Removal Area Boundary.

- 54. Page 64, Appendix A, Section A.3.2.2, sixth sentence: Nine sediment samples are said to have failed two of the three toxicity tests, although Table 3-5 indicates only eight.**

Response: Nine samples failed the CSL for two of three tests. This is indicated in the text and the table.

- 55. Pages 65 and 66, Appendix A, Tables A-3-15 and A-3-16: The numbers in these tables for Area 8 do not agree with those in Table 3-5.**

Response: The numbers in Tables A-3-15 and A-3-16 represent the results for the waterway as a whole. The results in Table 3-5 are for the Phase 2 Removal Area..

## Attachment C : Applicable Relevant and Appropriate Requirements (from EE/CA)

SOURCE	REQUIREMENT
1. State Model Toxics Control Act WAC 173-340-440	These regulations are applicable to establishing institutional controls for capping.
2. Federal Water Pollution Control Act/ Clean Water Act 33 USC 1251-1376 40 CFR 100-149	Acute Marine Criteria are anticipated to be relevant and appropriate requirements for discharge to marine surface water during sediment dredging.
3. Washington State Water Quality Standards for Surface Waters WAC 173-201A	Standards for the protection of surface water quality have been established in Washington State. The standards for marine waters will be applicable to discharges to surface water during sediment dredging.
4. Washington Sediment Management Standards WAC 173-204	Chemical concentration and biological effects standards are established for Puget Sound sediments and are applicable to the Phase 1 EWW removal action. Sediment cleanup standards are established on a site-specific basis from a range of concentrations.
5. State Water Pollution Control Act/Water Resources Act RCW 90.48 RCW 90.54	Requirements for all known, available, and reasonable technologies for treating wastewater prior to discharge to state waters are applicable to any dewatering of marine sediment prior to upland disposal.
6. Construction in State Waters, Hydraulic Code Rules RCW 75.20 WAC 220-110	Hydraulic Project Approval (HPA) and associated requirements for construction projects in state waters have been established for the protection of fish and shellfish.
7.State Discharge Permit Program/NPDES Program WAC 173-216 WAC 173-220	The Washington State NPDES program provides conditions for authorizing direct discharges to surface waters and specifies point source standards for such discharges. These standards are applicable to discharges to surface waters resulting from upland sediment dewatering operations during dredging and disposal work.
8.Federal Clean Water Act Dredge and Fill Requirements, Sections 401 and 404 33 USC 401 et. seq 33 USC 1251-1316 33 USC 1413 40 CFR 230-231 33 CFR 320-330	These regulations provide requirements for the discharge of dredged or fill material to waters of the United States, and are applicable to any in-water work. Section 401 requires certification for activities conducted under Section 404 authorities. The substantive requirements of a certification determination are applicable.
9.Federal Endangered Species Act of 1973	This regulation is applicable to any actions performed at this site as this area is potential habitat for threatened and/or endangered species. A

## **Attachment C : Applicable Relevant and Appropriate Requirements (from EE/CA)**

16 USC 1531 et seq. 50 CFR 200 50 CFR 402	biological assessment will be conducted in conjunction with the Remedial Design Documents in consultation with NOAA Fisheries and USFWS.
10. Rivers and Harbors Appropriations Act 33 USC 403 33 CFR 322	Section 10 of this act establishes permit requirements for activities that may obstruct or alter a navigable waterway. Activities that could impede navigation and commerce are prohibited. These substantive permit requirements are anticipated to be applicable to actions such as dredging, which may affect the navigable portions of the waterway.
11. Resource Conservation and Recovery Act 40 CFR 261.4(g)	This regulation is an exemption determining that dredged contaminated sediments that are subject to the requirements of Section 404 of the Clean Water Act are not RCRA hazardous waste. This exemption applies to in water disposal only.



## Attachment D: Cost Estimates for Remedial Alternatives

### Preliminary cost estimate for Alternative C dredging and disposal

CATEGORY	QUANTITY	UNIT COST (\$)	COST (\$)	TOTAL COST
<b>Dredging</b>				
Mobilization/Demobilization	1	\$250,000	\$250,000	
Site Preparation				
Construct dewatering/staging facility	1	\$150,000	\$150,000	
Dredging unsuitable sediments and upland disposal:				
Dredge, rehandle, dewater, transport and dispose at upland facility	200,000 cy	\$68	\$13,600,000	
Dredging suitable sediments and disposal at PSDDA site:				
Dredge and dispose clean sediments	59,000 cy	\$6/cy	\$354,000	
DNR disposal site use fee	59,000 cy	\$0.45/cy	\$27,000	
Subtotal Dredging				\$14,380,000
<b>Monitoring</b>				
Water quality monitoring during construction	1	\$350,000	\$350,000	
Construction oversight/management	1	\$150,000	\$150,000	
Subtotal Monitoring				\$500,000
<b>Engineering and Project Management</b>				
Engineering and permitting	1		\$0	
Internal Port staff	1		\$0	
Subtotal Engineering and PM				\$0
<b>Contingency on Dredging</b>	15%			\$2,160,000
<b>Total Cost</b>				<b>\$17,000,000</b>
Note:				
Total PSDDA unsuitable volume	200,000			
Total PSDDA suitable volume	59,000			
Total volume	259,000			

Total volume of suitable vs. unsuitable is based on previously calculated DMMUs, and adjusted to account for additional unsuitable volume that would be dredged based on a developed dredge plan.

**Preliminary cost estimate for Alternative B capping**

CATEGORY	QUANTITY	UNIT COST (\$)	COST (\$)	TOTAL COST
<b>Capping</b>				
Mobilization/Demobilization	1	\$150,000	\$150,000	
Capping Phase 1 Area 1:				
Purchase, transport and place 2-ft thick sand layer	88,000 cy	\$30/cy	\$2,640,000	
Purchase, transport and place 1-ft-thick armor layer	29,000 cy	\$35/cy	\$1,020,000	
Subtotal Capping				\$3,810,000
<b>Monitoring</b>				
Water quality monitoring during construction	1	\$350,000	\$350,000	
Construction oversight/management	1	\$150,000	\$150,000	
Subtotal monitoring				\$500,000
<b>Engineering and Project Management</b>				
Engineering and permitting	1			
Internal Port staff	1			
Subtotal Engineering and PM				\$0
<b>Contingency on Capping</b>	15%			\$572,000
<b>Total Cost</b>				<b>\$5,000,000</b>

Initial	IR	CH	ye		
Name	Rochlin	Field	Cohen	Gearheard	
Date	9/22/03	9/25	9/25/03		

Ordre commented by E-mail  
9/26/03